

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A substrate processing apparatus comprising:

a processing chamber which accommodates a substrate or substrates therein,

a heating member which heats said substrate or substrates,

at least one controller, said controller controlling gas supply to supply a first gas to the processing chamber through a first supply tube between the at least one controller and the processing chamber, and, alternately, to supply a second gas to the processing chamber through a second supply tube between the at least one controller and the processing chamber independent of the first supply tube,

a single gas supply member which supplies said first and second gases into said processing chamber and which has a portion extending to a region whose temperature is equal to or higher than a decomposition temperature of at least one of said two gases, the first supply tube including a first mass controller, a first valve and an inert gas line connected thereto downstream of the first valve between the first valve and the single gas supply member, the second supply tube including a second mass controller, a second valve, a reaction gas container and a third valve, the reaction gas container located between the second valve and the third valve, the second supply tube including an inert gas line connected thereto downstream of the third valve between the third valve and the single gas supply member, and a heater between the second mass controller and the single gas supply member, and

wherein

said first and second supply tubes are each individually connected to said gas supply member at a location whose temperature is lower than the decomposition temperature of said first gas or said second gas, and said first and second gases are alternately supplied into said processing chamber through said gas supply member in a manner that does not allow said first and second gases to be mixed with each other.

2. (Previously presented) A substrate processing apparatus as recited in claim 1, wherein said gas supply member is a nozzle having a plurality of gas injection openings.

3. (Previously presented) A substrate processing apparatus as recited in claim 2, further comprising:

a reaction tube which forms said processing chamber and which can accommodate a plurality of stacked substrates therein, wherein

said nozzle extends from a lower portion to an upper portion of said reaction tube along a direction in which said substrates are stacked.

4. (Currently amended) A substrate processing apparatus having a processing chamber which accommodates a substrate or substrates therein, and a heating member which heats said substrate or substrates, in which at least two gases which react with each other are alternately supplied into said processing chamber by a controller to form a desired film or films on a surface or surfaces of said substrate or substrates, comprising:

two supply tubes through which said two gases respectively flow independently from each other; and

a single gas supply member consisting of only one porous nozzle within the processing chamber which supplies said gases into said processing chamber and which has a portion extending to a region whose temperature is equal to or higher than a decomposition temperature of at least one of said two gases,

the two supply tubes including a first mass controller and a first valve for delivering an oxidizing agent containing oxygen from an oxidizing agent supply, and a second mass controller for delivering a metal organic gas from a metal organic gas supply to a gas container, and one of the two supply tubes including a heater between the first or second mass controller and said single gas supply member, wherein

said two supply tubes are connected to said gas supply member at a location whose temperature is lower than the decomposition temperature of said at least one gas, and said two gases are alternately supplied by said controller into said processing chamber through said gas supply member in a manner that does not allow said two gases to be mixed with

each other, wherein said two supply tubes and said gas supply member are connected to each other in said processing chamber.

5. (Previously presented) A substrate processing apparatus as recited in claim 1, wherein

a film produced by reaction of said first and second gases is adhered to an inner wall of said gas supply member.

6. (Previously presented) A substrate processing apparatus as recited in claim 5, wherein said controller supplies a

cleaning gas into said processing chamber through said gas supply member to carry out a cleaning operation of said processing chamber and a removing operation of said film adhered to said gas supply member.

7. (Previously presented) A substrate processing apparatus as recited in claim 1, wherein

one of said first gas and said second gas is trimethyl aluminum and the other of said first gas and second gas is ozone, and an aluminum oxide film or films are formed on a surface or surfaces of said substrate or substrates.

8. (Previously presented) A substrate processing apparatus as recited in claim 1, wherein

one of said first gas and said second gas is tetrakis (N-ethyl-N-methyl amino) hafnium and the other of said first gas and said second gas is ozone, and a hafnium oxide film or films are formed on a surface or surfaces of said substrate or substrates.

9. (Currently Amended) A substrate processing apparatus comprising

a hot wall type processing furnace which includes a processing chamber which accommodates a substrate or substrates therein,

a heating member which is disposed outside of said processing chamber and which heats said substrate or substrates,

at least one controller for supplying a first gas to the processing chamber through a first supply tube between the at least one controller and the processing chamber, and, alternately, for supplying a second gas to the processing chamber through a second supply tube between the at least one controller and the processing chamber independent of the first supply tube,

a single gas supply member which supplies said first and second gases into said processing chamber, and which has a portion disposed inside of said heating member, the portion disposed inside of said heating member consisting of only one porous nozzle, the first supply tube including a first mass controller, a first valve and an inert gas line connected thereto downstream of the first valve between the first valve and the single gas supply member, the second supply tube including a second mass controller, a second valve, a reaction gas container and a third valve, the reaction gas container located between the second valve and the third valve, the second supply tube including an inert gas line connected thereto downstream of the third valve between the third valve and the single gas supply member, and a heater between the second mass controller and the single gas supply member, and
wherein

said first and second supply tubes are connected to said gas supply member in a region whose temperature is lower than a temperature in said processing chamber in the vicinity of said substrate or substrates, and said first and second gases are alternately supplied into said processing chamber through said gas supply member in a manner that does not allow said first and second gases to be mixed with each other.

10. (Currently amended) A semiconductor device producing method using a substrate processing apparatus having a processing chamber which accommodates a substrate or substrates therein, and a heating member which heats said substrate or substrates,

two supply tubes extending into the processing chamber through which two gases respectively flow independently from each other; a first gas including an oxidizing agent including oxygen and a second gas including a metal organic gas, and

a single gas supply member which supplies gases from the supply tubes into said processing chamber and which has a portion consisting of only one porous nozzle extending to a region whose temperature is equal to or higher than a decomposition temperature of at least one of said two gases,

the two supply tubes including a first mass controller and a second mass controller, and one of the two supply tubes including a heater between the first or second mass controller and said single gas supply member,

said two supply tubes being connected to said gas supply member at a location whose temperature is lower than the decomposition temperature of said at least one gas,

the method comprising the steps of:

supplying a first one of said two gases to the single gas supply member through a first one of said two supply tubes for a first period of time while supplying an inert gas through a second one of said two supply tubes; and

after said first period of time, removing an atmosphere in the processing chamber; and

thereafter-alternately supplying a second one of said two gases to the single gas supply member through the second one of said two supply tubes for a second period of time to form a film or films on said substrate or substrates while supplying an inert gas through the first one of said two supply tubes.

11. (Previously presented) The substrate processing apparatus as recited in claim 1, wherein

the at least one controller is configured to control the gas supply to supply an inert gas through the second supply tube when supplying the first gas to the processing chamber through the first supply tube, and to supply an inert gas through the first supply tube when supplying the second gas to the processing chamber through the second supply tube.

12. (Previously presented) The substrate processing apparatus as recited in claim 9, wherein

the at least one controller is configured to control the gas supply to supply an inert gas through the second supply tube when supplying the first gas to the processing chamber through the first supply tube, and to supply an inert gas through the first supply tube when supplying the second gas to the processing chamber through the second supply tube.